REMARKS

In order to emphasize the patentable distinctions of applicants' invention over the prior art, claims 1 and 8 have been amended to incorporate the limitations of dependent claims 2-3, and 9-10, respectively. As amended, each of claims 1 and 8 recites a core that has a substantially constant permeability over a frequency range of about 1 to 1000 kHz. Claims 2, 3, 6, 9, and 10 have been cancelled to expedite prosecution.

Applicants' invention, as recited by present claims 1, 4, 5, 7, 8, and 11, provides a bandpass filter including an inductor with a magnetic core consisting essentially of an Fe-base amorphous metal alloy. The core has a constant permeability over a wide frequency range, e.g. a range of about 1 to 1000 kHz. Preferably the permeability is constant over a field strength range of approximately -15 to +15 Oe.

The use of a magnetic core consisting essentially of an Fe-base amorphous metal alloy, and which has a constant permeability over a range of 1 to 1000 kHz provides a number of advantages in constructing bandpass filters. As set forth in detail in applicants' specification, e.g. at page 5, lines 10-11, the resonant frequency of a filter circuit comprising an inductance L and a capacitance C is proportional to the quantity $1/(LC)^{1/2}$. The inductance of an inductor employing a magnetic core is known in the art to be generally proportional, in turn, to the effective permeability of the magnetic core. As a result, an inductor using a constant permeability core has a constant inductance, making it far easier to analyze and employ than inductors having more complicated, frequency-dependent magnetic characteristics. The latter inductors are also likely to produce unpredictable phase shift effects on signals passing through the inductor and its associated filter circuitry. Moreover, the power loss of the core of the present inductor is low. As a result, any filter circuit incorporating the inductor is more efficient and has a higher quality factor "Q" than circuits

employing more lossy devices. A high Q is beneficial in a filter, giving it a resonance that is narrower in frequency.

Claims 2 – 7 and 9 – 11 have been rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. In particular, the Examiner has indicated that the terms "substantially" and "approximately" are relative terms. Applicants respectfully disagree that their use renders the claim indefinite.

The Federal Circuit has ruled that "... the use of modifiers in [a]claim, like 'generally' and 'substantial,' does not by itself render the claim[] indefinite." ***Energy Absorption Sys., Inc. v. Roadway Safety Servs., Inc.***, Civ. App. 96-1264, slip op. at 10 (Fed. Cir. July 3, 1997) (unpublished), quoting *Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818 828-29, 221 USPQ 568, 575-76 (Fed. Cir. 1984). In an earlier proceeding, the CCPA stated that "It is realized that 'substantial distance' is a relative and somewhat indefinite term, or phrase, but terms and phrases of this character are not uncommon in patents in cases where, according to the art involved, the meaning can be determined with reasonable clearness." ***In re Hutchison***, 42 USPQ 90, 93 (C.C.P.A. 1939).

Applicants respectfully maintain that the terms "substantially constant permeability," "frequency range of approximately 1 to 1000 kHz," and "field strength range of approximately –15 to +15 Oe" delineates the subject matter of applicants' claims in terms that would be understood in light of the specification by one of ordinary skill in the relevant art. For example, manufacturers of inductors, transformers, and related magnetic components routinely provide data sheets and catalogs that delineate the items to have certain magnetic properties, e.g. magnetic induction, within a particular tolerance. Frequently, items are guaranteed to have properties falling within ±5% or

±10% of a nominal value. Magnetic components having properties falling within such a range would be understood by one skilled in the art as being "substantially constant."

Applicants' usage is further confirmed by reference to the data shown in Fig. 4a. These data are discussed in detail at page 6, lines 12 – 18. At line 17, the permeability of the core used in the present bandpass filter is said to be "constant up to about 1000 kHz range." However, inspection of the data in Fig. 4a reveals that the permeability measured at exactly 1000 kHz is several percent lower than at 10 kHz. Applicants respectfully submit that one skilled in the art would recognize the small variation in permeability evident in the graph between 10 and 1000 kHz as still being "substantially constant" in light of the teaching of the specification. By way of contrast, the sharp fall in permeability between 1000 kHz and 10,000 kHz also seen in Fig. 4a would represent a permeability that is not substantially constant. Applicants characterize this fall as a gradual linear decrease as the frequency is varied from 1000 kHz to 20,000 kHz (line 17 – 18).

Furthermore, one skilled in the art would recognize that the permeability of the core seen in Fig. 4a varies smoothly with frequency, so that some degree of variability in the precise frequency limits over which permeability may be said to be substantially constant is understood. Applicants use of the term "1000 kHz range" at page 6, line 17 is submitted to evidence applicants' understanding of the term "frequency range of approximately 1 to 1000 kHz" and enable one of ordinary skill to understand the meaning of this term as used in old claims 2, 5, and 10.

Similar considerations attend applicants' discussion of the field dependence of permeability depicted in Fig. 4b. In particular, it is submitted that the teaching at page 6, lines 19 – 25 enables one of ordinary skill to understand the usage of "approximately" in connection with the field ranges set forth in old claims 4, 7, and 11.

In view of the amendment to claims 1 and 8 and the foregoing remarks, it is submitted that applicants' usage of the terms "substantially" and "approximately" does not render indefinite any of claims 1, 4, 5, 7, 8, and 11, as amended.

Accordingly, reconsideration of the rejection of claims 2 – 7 and 9 – 11 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention is respectfully requested.

Claims 1-11 were rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4,881,989 to Yoshizawa et al. In view of the cancellation of claims 2, 3, 6, 9, and 10, this rejection will be discussed with respect to remaining claims 1, 4, 5, 7, 8, and 11, as amended.

The Examiner has stated that Yoshizawa et al. discloses a core structure for an induction device consisting essentially of an Fe-base amorphous alloy. Yoshizawa et al. discloses an iron-base soft magnetic alloy having a composition represented by the general formula: $(Fe_{1-a}M_a)_{100-x-y-z-\alpha-\beta-\gamma}Cu_xSi_yB_zM'_\alpha M''_\beta X_\gamma$ wherein M is Co and/or Ni, M' is at least one element selected from the group consisting of Nb, W, Ta, Zr, Hf, Ti and Mo, M" is at least one element selected from the group consisting of V, Cr, Mn, Al, elements in the platinum group, Sc, Y, rare earth elements, Au, Zn, Sn and Re, X is at least one element selected from the group consisting of C, Ge, P, Ga, Sb, In, Be and As, and a, x, y, z, α, β, and γ, respectively, satisfy $0 \leq a \leq 0.5$, $0.1 \leq x \leq 3$, $0 \leq y \leq 30$, $0 \leq z \leq 25$, $5 \leq y+z \leq 30$, $0.1 \leq \alpha \leq 30$, $\beta \leq 10$ and $\gamma \leq 10$, at least 50% of the alloy structure being fine crystalline particles having an average particle size of 100 nm or less. This alloy is said to have low core loss, time variation of core loss, high permeability and low magnetostriction. Yoshizawa et al. also discloses toroidal magnetic cores for use in various transformers, choke coils, saturable reactors, magnetic heads, and the like.

As amended, claim 1 calls for a core consisting essentially of an Fe-base amorphous metal alloy and having a substantially constant permeability over a frequency range of about 1 to 1000 kHz. Applicant respectfully traverses the Examiner's statement (in connection with claims 2, 5, and 10) that Yoshizawa et al. discloses a core having a substantially constant permeability over a frequency range of approximately 1 to 1000 kHz.

Applicants note that Yoshizawa et al. discloses measurement of the effective permeability of a number of cores over the range of 1 – 10,000 kHz. See, e.g., col. 19, lines 48 – 50 and Fig. 8; col. 20, lines 4 – 5 and Fig. 9; col. 20, lines 23 – 24 and Fig. 10; and col. 32, lines 7 – 10 and 20 – 22. Significantly, the data in Figs. 8, 9, and 10 do not reveal an Fe-base alloy core having substantially constant permeability. In particular, the Fe-base alloys in Figs. 8, 9 and 10 are labeled "A"; "A"; and "A" and "C", respectively. Curve A of Fig. 8 reveals a permeability that falls from 100,000 at 1 kHz to about 4000 at 1000 kHz, a drop of some 2000%. Substantial drops also are exhibited by curves A in Figs. 9 and 10, i.e. approximately 90,000 to 2,500 and 90,000 to 3,000, respectively, over the same frequency range. Even curve C in Fig. 10, which has a substantially constant permeability from 1 kHz to about 500 kHz, drops from approximately 6,000 at 1 kHz to 2,500 at 1000 kHz. Clearly, none of the cores used for obtaining the aforementioned permeability curves exhibits a substantially constant permeability over the range of about 1 to 1000 kHz, as required by applicants' amended claims 1, 5, and 8, and amended claims 4, 7, and 11, dependent thereon.

Moreover, the disclosure of Yoshizawa et al. at col. 32, lines 7 – 10 of a core having a direct current B-H curve of a low squareness ratio and constant permeability is submitted to fall far short of disclosing or suggesting applicants' claimed invention, there being no disclosure of a permeability that remains constant up to about 1000 kHz. The data of Figs. 8 – 10, discussed hereinabove, are submitted to teach away from the requirement of applicants' claims, inasmuch as

each of the cores tested has a permeability that departs from constancy at a frequency considerably below the 1000 kHz range demonstrated by applicants' claimed cores.

With respect to claims 3, 6, and 9, the Examiner has stated that Yoshizawa et al. discloses a core having substantially constant permeability. In view of the cancellation of claims 3, 6, and 9, it is submitted that this rejection is now moot.

The Examiner has further stated that Yoshizawa et al. discloses a constant permeability extant over a field strength range of approximately -15 Oe to +15 Oe, as delineated by claims 4, 7, and 11. This statement is, respectfully, traversed. Significantly, Yoshizawa et al. characterizes the low squareness ratio core of Fig. 30 as having constant permeability. Clearly the core having the B-H curves of Fig. 30(c) is in view, since it has a squareness ratio $B_r/B_{10} = 11\%$, whereas the curves of Figs. 30(a) and 30(b) have squareness ratios B_r/B_{10} of 54% and 93%, and corresponding to the medium and high squareness ratio cores mentioned at col. 32, lines 16 – 22. However, one skilled in the art would recognize the marked difference in shape between the B-H curves of Fig. 30(c) measured at a maximum applied field of $H_m = 0.1$ Oe and 10 Oe. One skilled in the art would further know that permeability at a given field strength may be represented approximately as the slope of the B-H curve taken with a maximum applied field of the given field strength. As a result, such a person would immediately understand that the core used to obtain the data of Fig. 30(c) would exhibit a marked fall in permeability between, e.g., 0.1 Oe and 10 Oe. More specifically, the sharp discontinuity in the 10 Oe B-H loop at about -1 Oe and +1 Oe would be manifest as a sharp fall in permeability on going outside the range of about -1 to +1 Oe. Even less would the core of Yoshizawa et al.'s Fig. 30(c) have a substantially constant permeability in a field range of approximately -15 to +15 Oe, as required by amended claims 4, 7, and 11.

In view of the cancellation of claims 2, 3, 6, 9, and 10, the amendments to claims 1 and 8, and the remarks set forth above, it is submitted that claims 1, 4, 5, 7, 8, and 11, as amended, are not anticipated by Yoshizawa et al.

Accordingly, reconsideration of the rejection of present claims 1, 4, 5, 7, 8, and 11 under 35 U.S.C. 102(b) as being anticipated by Yoshizawa et al. is respectfully requested.

In view of the amendments to the claims and the remarks set forth above, it is submitted that the present application is in allowable condition. Reconsideration of the rejection of present claims 1, 4, 5, 7, 8, and 11, and their allowance, are earnestly solicited.

Respectfully submitted,

Ryusuke Hasegawa, et al.

By

Ernest D. Buff
(Their Attorney)
Reg. No. 25,833
(973) 644-0008

Honeywell File No.: H0002699
Matter No.: 0017-17

Amended Claims – Version With Markings To Show Changes Made

CLAIMS

What is claimed is:

1. A bandpass filter, comprising an inductor having a core that consists essentially of an Fe-base amorphous metal alloy and has a substantially constant permeability over a frequency range of about 1 to 1000 kHz.

2. ~~A bandpass filter as recited by claim 1, wherein said core has a substantially constant permeability over a frequency range of approximately 1 to 1000 kHz~~.

3. ~~A bandpass filter as recited by claim 1, wherein said core has a substantially constant permeability~~.

4. A bandpass filter as recited by claim ~~3~~1, wherein said substantially constant permeability exists for a field strength range of approximately –15 to +15 Oe.

5. An inductor comprising a core that consists essentially of an Fe-base amorphous metal alloy, and has a substantially constant permeability over a frequency range of approximately 1 to 1000 KHz.

6. ~~An inductor as recited by claim 5, wherein said core permeability is substantially constant~~.

7. An inductor as recited by claim 5, wherein said substantially constant permeability is extant over a field strength range of approximately –15 to +15 Oe.

8. In a method for limiting frequency communications, the improvement wherein there is utilized an inductor having a core consisting essentially of an Fe-base amorphous metal alloy and having a substantially constant permeability over a frequency range of about 1 to 1000 kHz.

9. ~~A method as recited by claim 8, wherein said core has a substantially constant permeability~~.

10. ~~A method as recited by claim 9, wherein said substantially constant permeability is extant over a frequency range of approximately 1 to 1000kHz.~~

11. A method as recited by claim ~~10~~8, wherein said core permeability is substantially constant over a magnetic field strength range of approximately –15 to +15 Oe.